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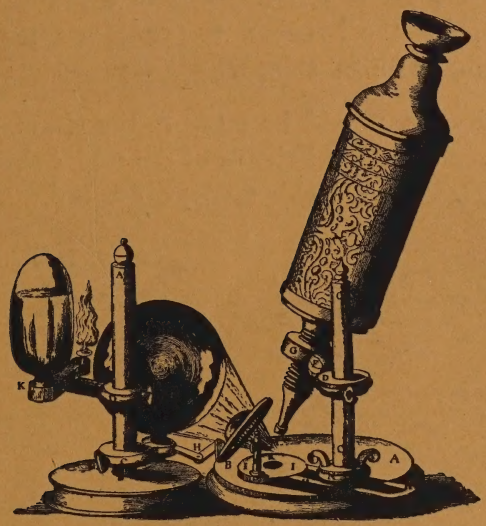

Hooke's Microscope from his 'Micrographia', 1665

MUSEUM OF THE HISTORY OF SCIENCE
OXFORD
1947

To our Medical Visitors

The acquisition of scientific apparatus of past centuries is becoming daily more difficult and expensive. Those who appreciate the work that has been done by this Museum can assist it by presenting any scientific apparatus made before the year 1900, for much that is commonplace to-day will have totally disappeared before a century has lapsed. They can help it still further by becoming Friends of the Old Ashmolean, whose subscriptions of a guinea a year have enabled the Museum to purchase many interesting and beautiful things.

Application should be made to the Curator or to the Secretary of the Friends of the Old Ashmolean, Dr. G. D. Parkes, Keble College, Oxford.

F. SHERWOOD TAYLOR
Curator

X70351

CATALOGUE OF AN EXHIBITION OF SCIENTIFIC APPARATUS

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THE MUSEUM OF THE HISTORY OF SCIENCE

THE Museum of the History of Science is a comparatively new institution, housed in a building which is the most considerable monument of that enthusiasm for Natural Science which characterized seventeenth-century Oxford. In the middle years of that century the Tradescants, father and son, made a remarkable collection of rarities which we should to-day class as being chiefly of biological and anthropological interest. These were shown for a small fee to the public in their house at Lambeth. Elias Ashmole, who was an antiquarian, astrologer, alchemist, and man of science, persuaded John Tradescant, the son, to bequeath him these collections. Tradescant died in 1662, and after some difficulties with the widow, the collections passed to Ashmole, who presented them to the University of Oxford. In the years immediately preceding and following the foundation of the Royal Society (1661) Oxford was the chief scientific centre of the country. Such men as Boyle, Wilkins, Wallis, Wren, Willis, Mayow, Lower, had formed a scientific society equal to that formed in London, and it was for a time questionable whether the Royal Society should operate there or in Oxford. The University therefore felt the need for an institution to be devoted to the teaching and study of Natural Science, and it used most of its scanty funds to erect this noble building. The identity of the architect remains uncertain, but all the more important features of the building correspond closely to a plan made but never executed by Sir Christopher Wren for a college of Science to be built in London. In accordance with tradition we may think it likely that even if Wren did not play the full part of an architect he at least indicated the main features of this building, so obviously from a master-hand and scarcely to be attributed to the local Oxford mason, Wood, whose name is commonly cited. Be this as it may, the building was completed and opened in 1683 by the Duke of York, later James II. Its nature, construction, and purpose are well described by Chamberlayne in his *Anglia Notitia* (1684):

'The Musæum, a large and stately pile of squared Stone, was built in order to the promoting, and carrying on with greater ease and success, several parts of useful and curious Learning, for which it is so well contrived and designed.

It borders upon the west end of the Theatre, having a very magnificent Portal on that side sustained by pillars of the Corinthian Order with several curious frizes, and other artificial embellishments. The Front about sixty Feet is to the Street, northward, where is this inscription over the entrance in guilt Characters, *Musæum Ashmoleanum, Schola*

Naturalis Historiae, Officina Chimica.[1] The first foundation was laid on the 14th of April 1679, and it was happily finished on the 20th of March 1683, at which time a rich and noble Collection of Curiosities, was presented to the University by that excellent and publick-spirited Gentleman, ELIAS ASHMOLE Esquire, a person so well known in the world that he needs no further elogium here.

The building consists of ten rooms, whereof the three principal and largest are public, being each in length about 56 feet and in breadth 25.

The uppermost is properly the *Musæum Ashmoleanum*, where an inferior officer always attends to show the rarities to strangers.

The middle room is the *School of Natural Historie*, where the professor of chymistry, Dr. Plot, reads three times a week.

The lower room, to which there is a descent by a double pair of stairs, is the laboratory, perchance one of the most beautiful and useful in the world, furnished with all sorts of furnaces and all other necessary materials. . . . Neare adjoyning to the laboratory are two fair rooms, whereof one is designed for a *Chymical Librarie.*

Neare the Musæum is a handsome roome fitted for a *Library of Natural History and Philosophy.*

The other remaining rooms are the lodging chamber and studies of the keeper of the Musæum, whereof one, which is most convenient, is sometimes employed and made use of for private courses of Anatomy.'

The building was known officially as the Ashmolean Museum, but undergraduates preferred to describe it as the *nick-nackatory*. In its early years it was the scene of much active scientific work, but during the eighteenth century, like almost all Oxford institutions, it experienced a time of stagnation. In the early nineteenth century there was a revival, and under Buckland, Kidd, Rigaud, the Duncan Brothers and others, excellent work was done; and the growth of science teaching in the University soon rendered it inadequate as a scientific centre.

In 1860 the zoological collections were moved to the new Museum in the Parks, the ethnographical collections following in 1886. The archaeological collections went to the University Galleries, the present Ashmolean Museum, in 1894; and the fine collections of books were taken over by the Bodleian library. Between the last-named year and 1924, the Old Ashmolean building was occupied by the lexicographers engaged upon the *New English Dictionary*.

Its second period of scientific usefulness is to be attributed to the munificence of the late Dr. Lewis Evans, and to the energy and devotion of the late Curator, Dr. R. T. Gunther. Dr. Lewis Evans, in the years between 1890 and 1910, built up a magnificent collection, principally of mathematical instruments and portable sun-dials. In 1922 he offered these to Oxford on the condition that they should be placed in the upper room of the Old

[1] This inscription has disappeared and may have been removed about 1860.

Ashmolean building. The collection was placed there in 1924 and has since been much augmented. The Colleges, most of which had acquired historic 'philosophical apparatus' of one kind or another, have deposited much of this in the Museum: these loans, with numerous purchases and benefactions, have together built up a remarkable and, indeed, unique collection of historic scientific apparatus.

In 1935 the Lewis Evans Collection became the Museum of the History of Science, and a further stage was reached in 1939 when it was decided to hand over to it the whole of the Old Ashmolean Building.

A brief survey of the collections may be of value. The most venerable and distinguished part is the magnificent series of astrolabes, which from the beginning of the Christian era until the sixteenth century were the most important instruments of astronomical observation and calculation. Almost equally impressive is the collection of sundials, of which almost every conceivable type is represented. There is also an exceptional collection of astronomical instruments, including unique specimens from the University Observatories. There are three very fine orreries—machines for representing by wheel-work the motions of the heavenly bodies—which are interesting, not only as scientific instruments, but also as pieces of furniture.

The collection of mathematical instruments includes drawing instruments of great beauty, and a series of calculating instruments such as sectors, adding-machines, Napier's Bones—the precursor of logarithms—and slide-rules of all periods from 1620 onwards. There are also very fine examples of surveying instruments and of way-wisers, the precursors of the taximeter.

The development of Electricity and Magnetism is illustrated by lodestones, compasses, a variety of eighteenth-century frictional machines, early batteries, and electrical apparatus in general. Air-pumps and other pneumatic devices of the eighteenth century are well represented, as are the numerous models which were employed in that century for the teaching of the simple principles of mechanics. The collection of microscopes and telescopes is exceptional, the University having recently acquired the collection of Dr. Reginald Clay, amounting to some 700 instruments. This collection affords an almost complete history of the microscope and telescope from the seventeenth to the mid-nineteenth century. The Museum likewise includes collections of chemical apparatus, of materia medica, and of surgical instruments; there is also a library of works, dealing with the history of science, which can be used by students on application to the Curator.

CATALOGUE OF MICROSCOPES AND ACCESSORIES

BY far the greatest part of the collection of microscopes and accessories were purchased in 1944 from Dr. Reginald E. Clay, co-author of Clay and Court's *History of the Microscope*. Only about a third of the microscopes in the collection are here catalogued: for the rest reference should be made to the detailed catalogue of the collection.

I. MICROSCOPES OF THE EARLIEST PERIOD (*c.* 1660–1720)

(*A*) *Early Compound Microscopes*

1. Copy of the original DIVINI MICROSCOPE (1668) by Mayall jun. (Clay Collection.)
2. Copy of the original CAMPANI MICROSCOPE (*c.* 1690) in the Science Museum, S. Kensington, by Mayall. (Clay Collection.)
3. Copy of CAMPANI MICROSCOPE (*c.* 1690) by Mayall. (Clay Collection.)
4. Model of the HOOKE MICROSCOPE as described in his *Micrographia* (1665).
5. MICROSCOPE (*c.* 1670) by CHRISTOPHER COCK whom Hooke, before 1678, instructed in the making of microscopes. Red leather body with lignum vitæ mounts; inner body of white vellum. Focusing by lignum vitæ screwed snout, working in horn collar mounted on three brass rods. Circular base with movable stage. One objective; all lenses original. (Clay Collection.)
6. MICROSCOPE (*c.* 1690). Leather body and draw-tube with gold stampings; lignum vitæ mounts, screwed focusing snout, and perforated stage.
7. MICROSCOPE (*c.* 1700). Red leather body with gold stamping; ivory and silver mounts. Ivory eyepiece. Horn-mounted objective. It presumably originally had a silver stand; this was missing and has been replaced by a new silver stand and lignum vitæ base. (Clay Collection.)
8. MICROSCOPE (*c.* 1700). Signed on the slider by FRANCIS BAILLOU à MILAN. Very long ivory screw-barrel in turned ring supported

on four brass pillars. Inner tube of green vellum with gold stampings. Ivory-mounted objective. Shaped leather case with gold tooling. (Clay Collection.)

9. 'GREAT DOUBLE MICROSCOPE' (*c.* 1715) by JOHN MARSHALL. Signed on the bottom of the drawer JOHN MARSHALL FECIT, LONDON. Outer body covered with grey shagreen, the inner of green vellum with gold stampings. Octagonal walnut box-foot with drawer; 6 objectives; opaque holder, and another with Bonanni stage; clamp to hold stage-condenser. (Clay Collection.)

   Marshall's design was far ahead of his time and has many modern features, such as the focusing screw, detachable objectives, and illuminating device. There is another and earlier John Marshall microscope in the Orrery Collection.

10. MICROSCOPE (perhaps *c.* 1720). Carved mahogany support for tube, which is covered in green vellum and has a horn rim. Mahogany snout and objective-mount. Stage is missing. The small mahogany base with drawer bears a concave mirror. Eye-lens is missing. (Clay Collection.)

11. MICROSCOPE. English (early eighteenth-century). Black horn and silver mounts; green vellum tube. Supports and part of base are of silver. Small black leather case. (Clay Collection.)

12. COMPOUND MICROSCOPE (early eighteenth-century). Scroll-work pillar. Ivory and horn body; horn eyepiece. Screw-focusing to stage, large plane mirror. Formerly the property of the mathematician, Nobili.

(*B*) *Early Simple Microscopes*

From the last quarter of the seventeenth century until the era of the achromatic objective, *c.* 1830, small single lenses of high magnification enjoyed considerable popularity. Their definition was superior to that of the non-achromatic compound microscopes and in skilful hands they could give very high powers.

13. LEEUWENHOEK MICROSCOPE. This is believed, but cannot be definitely stated, to be one of the many microscopes made by van Leeuwenhoek *c.* 1680. The object is mounted on the needle-point and viewed through the minute spherical lens. With such an instrument Leeuwenhoek saw bacteria. (Clay Collection.)

14. MICROSCOPE of MUSSCHENBROEK type from the George III Collection (*c.* 1690–1700). A development of the Leeuwenhoek type. The head in which the objectives slide swivels on a steel wire to give rough focusing; fine focusing by screw. 4 objectives; cock-piece; tube holder; pointed wires of brass and steel. (Clay Collection.)

15. MICROSCOPE of MUSSCHENBROEK type (*c.* 1690–1700). Similar to 14, but has a box which slides on the head with holes that act as diaphragms to limit the light. (Clay Collection.)

16. MICROSCOPE of JOBLOT type, unsigned (*c.* 1725). Brass. Screw-focusing by wheel-nut. The objectives are of the Leeuwenhoek type. Fish-plate; stage for transparent objects; stage-forceps on plate; spring-forceps; 3 glass tubes and 2 plates. In fish-skin case. (Clay Collection.)
(Illustrated by copy of JOBLOT'S *Nouvelles Observations* 1718. (Gunther loan Collection.)

17. COMPASS MICROSCOPE (early eighteenth century) with screw fine adjustment. Four objectives, each with lieberkuhn; stage-forceps; square frame on rod; turned ivory handle. In fish-skin case. (Clay Collection.)

18. COMPASS MICROSCOPE similar to 17, in solid wood case lined with red leather and covered with tooled leather. (Clay Collection.)

19. BOTANICAL MICROSCOPE. Object carried on needle fitting in sliding rod. (Clay Collection.)

20. BOTANICAL MICROSCOPE. Object carried on forceps movable along a slotted plate. (Clay Collection.)

21. POCKET MICROSCOPE (*c.* 1720). Six powers mounted in ivory sliders. Screw-focusing; object needle adjustable by chain of link-joints. In fish-skin case. (Presented by Mr. H. Minn.)

22. LINDSAY'S PATENT MICROSCOPE (*c.* 1750). Coarse adjustment by a slide and clamp; fine by a lever; 3 powers in brass slide; concave mirror. (Clay Collection.)

23. POCKET MICROSCOPE signed 'Jn^{O} CLARK/EDIN^{R} 1776.' In small fish-skin case. Rotating disk of 5 powers; fine adjustment by screw moving stage. Two sliders. Concave mirror. (Clay Collection.)

24. LYONNET MICROSCOPE. Designed in 1762 for making microscopical preparations. Square box-foot with drawer. Screwing on the box is a brass pillar to the top of which is fixed an oval mahogany tray with circular opening accommodating a glass disk. Arm with 4 ball-and-socket joints carries the lens. (Clay Collection.)

25. SCREW-BARREL MICROSCOPE, probably by Wilson but unsigned (*c.* 1706). All of ivory except the iron spring and the brass and leather plates that hold the sliders. Eight lenses, two sliders. The handle has been renewed. (Clay Collection.)

26. SCREW-BARREL MICROSCOPE similar to No. 25, but with black fish-skin case lined with green velvet. (Clay Collection.)

27. SCREW-BARREL MICROSCOPE signed 'E. Culpeper. Londini' (*c.* 1710). Six ivory-mounted objectives. Magnifier mounted in brass and ivory. Dust-cap. Brass forceps. Three brass diaphragms stage forceps and black-white disk mounted on plate. Black fish-skin case.

28. SCREW-BARREL MICROSCOPE (*c.* 1710) in ivory and wood, probably cocus. Wood side-plate to carry lens when examining opaque objects. Ivory stem and needle, fitting in movable horn washer. Three sliders and glass for long live-box. With a Cuno form compass microscope of ivory and wood. In leather case lined with red leather. (Clay Collection.)

29. SCREW-BARREL brass MICROSCOPE, signed 'E. Culpeper Fecit'. The case and fittings were purchased separately from the barrel, but as they fit it are presumably those belonging to it. (Clay Collection.)

30. SCREW-BARREL brass MICROSCOPE signed 'Ed. Scarlett Fecit'. Very similar to No. 29, though not so complete. (Clay Collection.)

31. SCREW-BARREL MICROSCOPE in black ivory with silver mounts. Its similarity to No. 30 indicates that it is probably by E. Scarlett. 6 objectives, 4 with dust-caps; silver arm to carry lens for opaque objects. Black and white disk, hand magnifier, silver plate to carry forceps, double-ended leather and card case with 9 sliders. (Clay Collection.)

32. SCREW-BARREL BRASS MICROSCOPE with ivory compound body, signed 'E. Culpeper Fecit'. Stand with folding foot and ball-and-socket joint to body. Ivory handle; 6 objectives; two ivory boxes; sideplate for opaque objects. (Clay Collection.)

33. SCREW-BARREL MICROSCOPE signed G. CRAMER GRONIGAE FECIT. With additional brass compound body. Carved ebony base with brass mounts and scroll support to body in rosewood pyramid case with drawer. Six objectives with ivory dust-caps, concave mirror. (Clay Collection.)

II. 'CULPEPER-TYPE' MICROSCOPES

The Culpeper-type microscope had the advantage over earlier instruments, first of much greater steadiness, and secondly of the better illumination provided by the concave mirror, which appears to be the invention of Culpeper.

(*A*) *By E. Culpeper*

34. CULPEPER MICROSCOPE by Culpeper himself (*c.* 1725). Black shagreen body. Green vellum draw-tube. Lignum vitæ mounts. Box top (restored) above eyepiece. Oak pyramid case with Culpeper's trade label. (Clay Collection.)

35. CULPEPER MICROSCOPE, second form (*c.* 1730). As 34 but without box-top. Bonanni stage, clips below for glass fish-plate. (Clay Collection.)

36. CULPEPER MICROSCOPE, third form (*c.* 1730). As 35 but with sunk stage. Two fish-plates; 3 objectives in black ivory mount; super-stage condenser; Bonanni stage. Black-white disk. In pyramid case with trade label. (Clay Collection.)

37. CULPEPER MICROSCOPE. As 36 in most respects. Interesting card with description and request to the purchaser that he will not allow it to be copied. In pyramid box with part of label. (Clay Collection.)

(*B*) *By other English Makers*

38. CULPEPER-TYPE MICROSCOPE by MATTHEW LOFT (*c.* 1745). Signed on label in drawer. Red shagreen body; green vellum draw-tube marked for 5 foci. Lignum vitæ mounts for eyepiece and snout. Five objectives in brass cells; fish-plate with silk tapes; Bonanni

stage; revolving object-carrier; live-box with six ivory sliders; stage-forceps; springs for dipping-tube. In mahogany pyramid case. (Clay Collection.)

39. CULPEPER-TYPE MICROSCOPE by MATTHEW LOFT. Similar to 38, but the shagreen body is replaced by a brass body and inner tube with a Cuff lieberkuhn-carrier and lieberkuhn reflector. (Clay Collection.)

40. CULPEPER-TYPE MICROSCOPE signed by I. CUFF, LONDON. Red shagreen body, stand and legs similar to those of 38 and 39. The objectives screw *inside* the snout. (Clay Collection.)

41. CULPEPER-TYPE MICROSCOPE. Probably by SCARLETT but unsigned. Leather outer body with gold stampings. Inner body of green vellum. Lignum vitæ mounts. (Clay Collection.)

42. CULPEPER-TYPE MICROSCOPE probably by SCARLETT. As 41, but with grey shagreen body. Oak case. (Clay Collection.)

III. NUREMBERG 'CULPEPER-TYPE' MICROSCOPES

The Culpeper and, later, the Cuff and the Solar microscope were copied in wood by the toy-makers of Nuremberg. These instruments were sometimes used for serious microscopical work in Germany, even after the end of the eighteenth century.

43. NUREMBERG MICROSCOPE signed IM. (JUNKER of MAGDEBURG. 1791.) Pearwood. Two draw-tubes. Dust-cap over eyepiece. Extra objective screwed to bottom of stage; wooden slider in paper case. (Clay Collection.)

44. NUREMBERG MICROSCOPE by IM with slider. (Clay Collection.)

45. NUREMBERG MICROSCOPE. Signed JFF. (Clay Collection.)

IV. BRASS 'CULPEPER-TYPE' MICROSCOPES

46. CULPEPER MICROSCOPE in brass signed NAIRNE & BLUNT. LONDON. Sliding focusing body in sprung lining of outer tube. Mahogany foot with drawer. Numerous accessories. Mahogany pyramid case. (Clay Collection.)

47. CULPEPER MICROSCOPE in brass, unsigned. Rack-focusing. Five objectives; lieberkuhn and holder; frog-plate and other accessories. (Clay Collection.)

48. CULPEPER MICROSCOPE in brass, signed W. & S. JONES, 135 HOLBORN, LONDON. Scroll legs on mahogany disk stand. Mahogany pyramid case. (Clay Collection.)

V. ENGLISH CUFF MICROSCOPES

The Cuff microscope was probably introduced in 1744. John Cuff probably followed the general design of John Marshall (see No. 9). The principal merits of the new design were the focusing-screw, and the omission of the legs of the Culpeper microscope, which were very much in the way if any large object was to be examined.

49. CUFF MICROSCOPE signed J. CUFF. LONDON. MAKER. Body-focusing with Cuff's clamp and screw. Three-armed stage. Numerous accessories in pyramid case (*c.* 1750). (Clay Collection.)

50. CUFF MICROSCOPE signed J. CUFF. LONDINI. INVT. & FECIT. Otherwise as 49 (*c.* 1745). (Clay Collection.)

51. CUFF MICROSCOPE by MANN & AYSCOUGH. Similar to 49 but with stage-focusing and only two arms to stage. These makers began to copy the Cuff model about 1745. (Clay Collection.)

52. CUFF MICROSCOPE by PYEFINCH/LONDON/CORNHILL. This instrument is notable as having an inclinable pillar. (Clay Collection.)

53. CUFF MICROSCOPE labelled on case 'JOHN GILBERT, at the Mariner, Paternoster Row, Tower Hill, London'. Cylindrical pillar with rack; may be the first example of a microscope with cylindrical pillar (*c.* 1765). (Clay Collection.)

54. CUFF MICROSCOPE signed S. JOHNSON (1751). Described by E. M. Nelson (J. Quekett M.C. 1911). Johnson was only an optician and the microscope was probably made by J. Mann. (Clay Collection.)

VI. FOREIGN CUFF MICROSCOPES

55. MICROSCOPE. Early Dutch (?). Polished black box-foot with drawer. Stage supported on wrought iron brackets. Pillar with turned base. Cuff fine-adjustment to arm on which body screws. Bonanni

stage; alternative stage with large ring, and pointed rod. Plane mirror. Seven objectives and two magnifiers. 2 glass plates. Slider. (Clay Collection.)

56. CUFF MICROSCOPE. Signed PASSEMENT/INGÉNIEUR DU ROI AU LOUVRE. Three-arm stage, fittings of the usual Cuff type. (Clay Collection.)

57. CUFF MICROSCOPE, unsigned foreign copy. Body carried on arm with Hevelius clamp and screw. Wheel of 6 powers. (Clay Collection.)

58. CUFF MICROSCOPE by French maker. Walnut body and box-foot. Rack-focusing for body; fixed stage. (Clay Collection.)

59. CUFF MICROSCOPE. FOREIGN DEVELOPMENT. Brass with mahogany drawer-foot. Cuff body and parallel snout. Lieberkuhn screws on the nose on a spiral tube. Cuff stage on two turned pillar. Rackwork focusing. Mirror mounted on dove-tail slide. Six objectives; condenser; lieberkuhn; glass plate; 2 sliders. (Clay Collection.)

60. CUFF PATTERN MICROSCOPE, probably French. Box-foot with mother of pearl decoration. Brass limb, body and stage; wooden eye-piece. Four live-boxes, wooden slider, cut-glass slides. (Clay Collection.)

61. BOX MICROSCOPE, French eighteenth-century. Compound body in black leather with wood mounts. Clamp and Cuff-screw fine adjustments. Plane mirror in decorated and inlaid box. (Clay Collection.)

62. NUREMBERG COPY OF CUFF MICROSCOPE. Black wooden pillar and base. Usual type of Nuremberg body, with brass Cuff-type clamp and focusing screw. (Clay Collection.)

63. NUREMBERG COPY OF CUFF MICROSCOPE. Rectangular box-foot with turned pillar. Body and stage supported by clamped arms. Three objectives in wood mounts; wooden Bonanni stage. Two wood sliders, one with hollows; wood talc-box. (Clay Collection.)

VII. CHEST MICROSCOPES

64. CHEST MICROSCOPE with Cuff-model body, stage, and focusing. Signed 'NAIRNE LONDON INVT. ET FECIT'. The microscope is carried on a pillar hinged to one end of a mahogany case, so that it can

be folded down into the case and can be used inclined at any angle. (Clay Collection.)

65. CHEST MICROSCOPE signed DOLLOND, LONDON. Rack-focusing to stage. Showing mode of packing. (Clay Collection.)

VIII. SOLAR MICROSCOPES

The Solar microscope is an adaptation of the Camera Obscura and Magic Lantern. The instrument is fixed in a hole in a shutter, a beam of sunlight is directed by a moveable mirror through the object and projected by a lens of high magnification upon a white surface. John Cuff seems to have been the inventor of the moveable mirror.

66. SOLAR MICROSCOPE, unsigned but almost certainly Cuff's original solar microscope. Mahogany square base. Mirror rotated by gut-string tightened by screw. Brass screw-band and mounting for use apart from solar microscope (*c.* 1740–50). (Clay Collection.)

67. SOLAR MICROSCOPE, signed GEO. ADAMS. All brass; rack-focus to barrel. Mirror rotated and inclined by rack. Mahogany case (not shown) with 4 objectives, condenser in brass slide, long brass live-box, ivory talc-box, forceps and two long brass screws for attachment to shutter.

68. NUREMBERG SOLAR MICROSCOPE. Body-tube and inner tube are covered with paper; the rest blacked and polished. Wooden screw-barrel; wooden cog-wheels to turn mirror which is inclined by a string. (Partly restored.)

IX. LUCERNAL MICROSCOPE

The Lucernal microscope is similar to the solar in principle, but the sun is replaced by a lamp and the image received on a ground-glass screen.

69. LUCERNAL MICROSCOPE by W. & S. JONES, 30 HOLBORN, LONDON. Conical wood body; screw focusing to stage; 5 objectives, 3 wood sliders; 1 brass slider. Mahogany box with drawer and long dovetail slide in which the instrument fits. (*c.* 1810.)

X. MICROSCOPES BY F. WATKINS

Francis Watkins was apprenticed in 1737 and was partner to Addison Smith, 1764–74: d. 1785.

70. SIMPLE MICROSCOPE, unsigned. The stem is carried on a folding tripod. Stage is attached to a sprung sleeve sliding on the limb, so giving coarse adjustment. Rotating disk with 6 powers is focused by a screw passing through the limb and moved by a milled nut.

71. MICROSCOPE signed F. WATKINS, CHARING CROSS, LONDON (*c.* 1754). This microscope marks an important stage in the evolution of the instrument. It has (1) the body, stage, and mirror all on one arm; (2) plane and concave mirror; (3) spring stage moved by a rack; (4) folding foot. With numerous accessories. The instrument is described by Watkins in his book *L'Exercise du Microscope . . . A Londres Imprimé pour Francois Watkins Opticien, à Charing Cross, 1754.*

XI. MICROSCOPES BY BENJAMIN MARTIN

Benjamin Martin, 1704–82, was not only a maker of microscopes and other scientific instruments, but also the author of a number of semi-popular books on many aspects of science.

72. DRUM MICROSCOPE, signed on inner body B. MARTIN/LONDON (*c.* 1750). Shagreen outer body on brass foot; green vellum inner body; lignum vitæ eyepiece and snout. Brass sliding dust-cap and stage. (Clay Collection.)

73. DRUM MICROSCOPE, similar to 72 but larger.

74. OPTICAL CABINET, signed MARTIN. LONDON. (*c.* 1750.) Solar microscope. Screw-barrel microscope to be used therewith. Brass drum microscope. Green shagreen telescope with vellum draw-tubes. (Clay Collection.)

75. MICROSCOPE, signed MARTIN INVT & FECIT No. 6. Stage has coarse (rack) and fine (screw) focusing. The body can be moved in arc. Two-lens objective and 3-lens eyepiece. In flat fish-skin case. (Clay Collection.)

76. 'UNIVERSAL' MICROSCOPE by MARTIN (unsigned), 1776. Pillar hinged at bottom to folding tripod. Rack-focusing stage. Rotating disk of powers. Four extra powers. Numerous accessories. In mahogany case. The word 'Universal' at this date indicates an instrument with simple and compound lenses and also with an aquatic movement, i.e. one whose tube is so fitted that it can be moved radially and in arc so as to be brought over any part of the stage.

XII. MICROSCOPES BY GEORGE ADAMS

77. UNIVERSAL SILVER MICROSCOPE signed MADE BY GEORGE ADAMS. This magnificent instrument was made for George III in 1761. Elaborate silver stand and pillar carrying large wheel of powers, one with lieberkuhn. Compound body with micrometer screw. Stage focusing to mechanical stage. Eyepiece for using powers as simple microscopes, for which purpose there is a second stage with full movements and focusing mechanism. Two plane and convex mirrors. Superstage condenser with elaborate universal joint. Twelve sliders; fish-plate; ivory talc-box; stage forceps; simple magnifiers; extra lieberkuhn. (Presented by Sir John Findlay.)

78. 'UNIVERSAL' MICROSCOPE signed INVENTED & MADE BY G. ADAMS AT TYCHO BRAHE HEAD. FLEET STREET. LONDON. Compound body of black ivory. Ring of eight powers. Sliding coarse adjustment and screw fine adjustment to stage. Simple microscope can be used in place of the compound body. Numerous accessories. Black fish-skin case. With solar attachment (which screws in base in place of mirror) in wooden box with Adams's trade-card (*c.* 1750). (Clay Collection.)

79. LARGE MICROSCOPE in brass signed ADAMS LONDON with very complete fittings and accessories in mahogany case. Focusing stage, large mirror, substage condenser. Field lens and 3-lens eyepiece.

XIII. MICROSCOPES OF LATE EIGHTEENTH AND EARLY NINETEENTH CENTURY

80. 'MOST IMPROVED' MICROSCOPE signed W. & S. JONES, 34 HOLBORN, LONDON. A very popular type of microscope. Body, stage, condenser, and mirror are carried on a long square limb, hinged to the top of the pillar. The body has a transverse motion and can turn in arc. Rack-focusing stage. Numerous accessories (*c.* 1800). (Clay Collection.)

81. MICROSCOPE probably by DOLLOND; similar to No. 80, but with triangular pillar. Rack and screw focusing to stage. (Clay Collection.)

82. MICROSCOPE, unsigned but evidently by DELLEBARRE. Square pillar on folding telescopic foot. Stage condenser and mirror mounted on square tubes and are hinged to allow them to be folded. Body slides in a ring lined with leather. Stage focusing by rack. Four-lens eyepiece.

83. ACHROMATIC IMPROVED MICROSCOPE signed SELON EULER PERFECTIONNÉ PAR VINCT. CHEVALIER AINÉ ET FILS ING. OPTICIENS BREVETÉS. QUAI DE L'HORLOGE No. 69 à PARIS. Similar in construction to 80. Two achromatic objectives, Amici illuminating prism. Supposed to be made to a formula of Euler in 1827. Mahogany box. (Clay Collection.)

84. REFLECTING MICROSCOPE by AMICI (1784–1863). This is a Newtonian telescope reversed. Mirror about $1\frac{1}{4}$-inch diameter and of 4-inch focus (*c.* 1820). (Clay Collection.)

Reflecting microscopes were designed to overcome the difficulty of chromatic aberration. The advent of the achromatic lens put an end to their development.

85. COMPOUND REFLECTING MICROSCOPE signed JOHN CUTHBERT. LONDON. The objectives are minute Newtonian telescopes with an elliptic concave mirror, in one focus of which the object is placed, and a tiny plane mirror at 45 degrees on the axis of the concave mirror. (Clay Collection.)

86. MICROSCOPE by AMICI. Substage Amici prism. Sliding body, fine adjustment to stage; concave mirror; substage condenser with diaphragm. On circular brass foot. Originally from Bologna University. (Clay Collection.)

87. MICROSCOPE by AMICI. Sliding body for rough focus. Fine adjustment to stage. One objective; two eyepieces; superstage Amici prism. Folding tripod stand. Bought by Lord Howe from Amici. (Clay Collection.)

88. MICROSCOPE engraved VARLEY INVENT. LONDON, but probably made by Pritchard. Interesting movement for stage. Long-range coarse adjustment by rack. Lever fine adjustment. Two eyepieces. (Clay Collection.)

89. MICROSCOPE signed ANDREW PRITCHARD No. 122. 162 FLEET STREET. LONDON. Coarse adjustment by rack: fine adjustment by collar at base of body tube. Turrell mechanical stage. Concave and plaster mirror. (Clay Collection.)

90. MICROSCOPE signed ANDREW PRITCHARD, 263 STRAND, LONDON. Cylindrical limb. Triangular bar with rack for focusing. Two telescoping rods attach the top of the body tube to the stand, so

giving steadiness. A jointed arm affords a means of attaching lamp or bull's eye. (Clay Collection.)

91. JEWEL MICROSCOPE signed PRITCHARD PICKET ST LONDON. A simple microscope employing minute jewels (sapphires?) as lenses. Semi-mechanical stage. Two low powers; 4 high. In flat mahogany case (*c.* 1825). (Clay Collection.)

The attempt to obtain high magnifications by means of jewel lenses of high refractive index was abandoned after the achromatic lens had become capable of good definition at high magnifications.

92. MICROSCOPE, LISTER-TULLY 1826. Similar in many respects to 90.

XIV. ACHROMATIC MICROSCOPES AFTER 1840

The improvement of the achromatic lens led to the high-power compound microscope, and the use of high powers necessitated a heavy construction, a body free from shake, and well-made coarse and fine adjustments. The firms of POWELL & LEALAND and of ANDREW ROSS were leaders in the improvement of microscopes between 1840 and 1870.

93. SIMPLE AND COMPOUND MICROSCOPE signed H. POWELL 24 CLARENDON STRT, SOMERS TOWN, LONDON. Including cylindrical limb hinged to top of extending pillar on 3-toed foot. Rack-focusing body. Detachable cone-focusing stage. Double mirror. (Clay Collection.)

94. MICROSCOPE signed POWELL & LEALAND, MAKERS, LONDON, as described in their pamphlet dated 1842. Body, stage, and mirror carried on trunnions on the top of a pair of turned pillars. Beautifully working rackwork and mechanical stage. Numerous accessories in mahogany box. (Clay Collection.)

95. MICROSCOPE signed POWELL & LEALAND, MAKERS, LONDON. 1843. Carried on a block in trunnions in a 3-claw foot. Sensitive cone fine-adjustment in transverse arm, acting on nose-piece. Turrell stage, focusing substage, large and small sprung stages. Two eyepieces and various accessories. (Clay Collection.)

96. MICROSCOPE signed POWELL & LEALAND 170 Euston Road, LONDON. Body carried on the 'Lister' limb. This limb is mounted on one side of a pillar forming an upward extension of a 3-claw tripod. Cone fine-adjustment; lever stage; rotating diaphragm; concave and plane mirrors. (Clay Collection.)

97. MICROSCOPE signed POWELL & LEALAND, 1 SEYMOUR PLACE, EUSTON SQUARE. 1849. Stage, body and mirror mounted on carriages on a very large triangular bar. Very fine adjustment to the stage by wedges which lift the top plate. Bar steadied by a pair of T-pieces. Two cases of accessories. (Clay Collection.)

98. MICROSCOPE signed A. ROSS. LONDON. Body supported by a block carried on trunnions on a claw-foot. Limb is a tube moved by a rack at the back. Fine adjustment by cone acting direct on nose-piece. Compound mechanical stage. Concave and plane mirrors. Two eyepieces; 1 inch, $\frac{1}{2}$ inch, and $\frac{1}{4}$ inch objectives. (Clay Collection.)

99. MICROSCOPE signed ANDREW ROSS & CO. OPTICIANS, 33 REGENT STREET, PICCADILLY. Body carried on saddle with rack-focusing upon a Lister limb. Fine adjustment on nose-piece; mechanical stage; double mirror; 2 inch objective. (Clay Collection.)

100. MICROSCOPE signed A. ROSS LONDON (Grand Model. 1857). Large prismatic limb in rectangular block supported between two flat upright. Transverse carries body. Rack-focusing to limb. Lever fine adjustment. Mechanical stage; rack-focusing centering and rotating substage. Three eyepieces; $\frac{2}{3}$ inch, $\frac{1}{2}$ inch, $\frac{1}{4}$ inch objectives ($\frac{2}{3}$ inch with lieberkuhn). Nicol and black-glass polarisers; eyepiece analyser. Substage achromatic condenser with 18 diaphragms. With many other accessories in cabinet. (Clay Collection.)

XV. POCKET MICROSCOPES

101. POCKET MICROSCOPE by W. & S. JONES, formerly the property of Sir Benjamin Collins Brodie (sen. ?). In fish-skin case, with leaflet of directions.

102. GOULD MICROSCOPE by CARY LONDON. On heavy circular foot. Stage focusing; mechanical stage; concave mirror. (Clay Collection.)

103. GOULD MICROSCOPE by DOLLOND, LONDON. Square pillar, hinged to bottom of box. Rotating disk of 6 powers; black-white disk; glass plate; spring stage forceps: 4 sliders; ivory-handled needle; live-box. (Clay Collection.)

104. POCKET MICROSCOPE, WOLLASTON TYPE By CARY, LONDON. Wollaston diaphragm and substage lens; one high-power

Wollaston lens; mount for low power and a French achromatic objective. In mahogany case. (Clay Collection.)

105. POCKET MICROSCOPE made by JEREMIAH SISSON (*c.* 1756) for Dr. Demainbray, tutor to George III.

XVI. CONTINENTAL MICROSCOPES (Early Nineteenth Century)

106. DRUM MICROSCOPE signed MAISON DE L'ING^{R} CHEVALLIER OPT^{N}/PLACE DU PONT NEUF, 15, PARIS. Sliding body tube; fine adjustment to stage; concave mirror.

107. AQUATIC MICROSCOPE signed L'ING^{R} CHEVALIER/OPTICIEN DU ROI PLACE DU PONT NEUF, 15, PARIS. Aquatic arm with rack-focusing; 4 objectives, large ring-stage; with glass plate; large mirror forceps; 2 needles; 1 slider. Mahogany case.

108. AQUATIC MICROSCOPE signed CHARLES CHEVALIER/PALAIS ROYALE 163/PARIS. DEUX MEDAILLES D'OR EN 1834. Rack-focusing arm with rack traverse and rotating on pin; 2 rings, one for low power, the other for 6 powers, all signed CHARLES CHEVALIER. Numerous accessories.

109. MICROSCOPE ACHROMATIQUE UNIVERSAL DE CHARLES CHEVALIER, INGÉNIEUR OPTICIEN BREVETÉ, PALAIS ROYALE 163, À PARIS. Three-toe foot and turned pillar. Square limb connected to top of pillar by compass-joint. Focusing stage. Prism and horizontal body, which can also be used vertically. Rack draw-tube; mechanical stage; substage with screw movement. Mahogany case.

110. DRUM MICROSCOPE signed NACHET OPTICIEN, RUE SERPENTE, 16, PARIS. Sliding body. Screw fine adjustment to stage. Three achromatic button objectives. Two eyepieces. In mahogany case.

111. INVERTED MICROSCOPE signed NACHET/OPTICIEN/RUE SERPENTE, 16, PARIS. Stage carried on casting 4 inches above table. Objectives below stage. Coarse adjustment by sliding the objective. Fine adjustment by milled ring. Prism throws light up body tube. A stem carries the mirror and condenser.

112. POCKET MICROSCOPE signed NACHET ET FILS/17, RUE ST SEVERIN/PARIS. Fits very neatly into small brass box.

113. STUDENT'S MICROSCOPE signed NACHET ET FILS/17, RUE ST SEVERIN, PARIS. Sliding coarse and continental fine adjustment. Two eyepieces; 3 objectives. In mahogany box.

114. MICROSCOPE signed PLOSSL IN WIEN. Vertical steel triangular limb mounted on folding tripod foot. Micrometer stage with fine adjustment; rack-focusing to body. Right-angle prism and horizontal eyepiece.

XVII. BINOCULAR MICROSCOPES

115. BINOCULAR MICROSCOPE signed POWELL & LEALAND, MAKERS. LONDON. 1845. Rack-focusing to eyepiece; superstage mirror; mechanical stage. Centering substage focused by rackwork. Condenser with wheel of diaphragms and stops. Box with mounted objects including Podura. (Clay Collection.)

116. BINOCULAR MICROSCOPE signed MURRAY & HEATH, LONDON. Has two separated prisms, which makes it difficult to adjust. Continental fine adjustment. Rack movement to eyepieces for interocular adjustment. (Clay Collection.)

117. BINOCULAR MICROSCOPE signed AND^{W} ROSS & CO. OPTICIANS 33 REGENT ST PICCADILLY. REGISTERED No. 4380 June 27th 1861. Pair of achromatic prisms. Spare monocular body. The binocular tube is later than the rest.

118. BINOCULAR MICROSCOPE signed POWELL & LEALAND 170 EUSTON ROAD LONDON. 1864. Wenham prism. Very complete accessories. With spectroscope body by John Browning. All parts marked R.L.

119. BINOCULAR MICROSCOPE signed SAMUEL HOLMES INVENTOR, PATENTEE & MANUFACTURER, LONDON, 1869. Has a symmetrical achromatic prism mounted at the bottom of a long narrow tube that projects into the objective. Stage focusing by milled head. (Clay Collection.)

120. BINOCULAR MICROSCOPE engraved HUSBAND & CLARKE, BRISTOL. Possibly by ROSS, as it is on trunnions with rectangular bar and lever fine-adjustment. Mechanical and rotating stage (divided); rack-focusing centering and rotating substage. Wenham prism. In mahogany case with a second case full of fittings. Both in outer wooden case. (Clay Collection.)

121. STEVENSON BINOCULAR MICROSCOPE. Prisms and bent body tube only. Contains a pair of reflecting prisms back to back, the reflecting faces nearly parallel, and another prism at the bend. (Clay Collection.)

ANATOMICAL PREPARATIONS

The preparations here shown come from Lee's Anatomy School at Christ Church, built in 1765. There is no indication of their date, but we learn that about 1832 Dr. Kidd, the Anatomy Reader, obtained leave to lecture on models and preparations instead of actual bodies owing to difficulties arising through an Act of Parliament limiting the use of bodies for dissection. Dr. Carl Gustav Carus, physician to the Court of Saxony visiting this establishment, reported:

> Above the Professor's table hung a human skeleton, and a figure showing the muscular conformation of the human subject: so that they could be let down and drawn up again by cords. . . . All round the theatre, behind the amphitheatrical seats of the audience, were skulls and anatomical preparations, everything quite in the antique style. Professor Kidd, a good-natured old gentleman, quite corresponded with these ancient treasures.

I. DRIED AND INJECTED PREPARATIONS

200. HEART AND MAIN BLOOD-VESSELS OF INFANT injected with vermilion, dried and varnished.

201. FOREARM OF CHILD. Dry preparation. Injected to show principal blood-vessels.

202. ELBOW JOINT. Dry preparation. Arteries injected in red and veins in black.

203. HAND. Dry preparation injected in red and white to show vascular system.

204. PELVIC REGIONS. Dry preparation injected to show vascular system.

205. GALL-BLADDER AND PANCREAS. Dry preparation injected in red and green.

206. MESENTERY AND INTESTINE. Dry preparation, intestine inflated, and blood-vessels injected in vermilion.

207. PELVIC REGION. Dry preparation injected to show arteries.

208. THORAX. Dry preparation, heart and main blood-vessels injected.

209. TRUNK OF FOETUS dried. Arteries injected in red.

II. DRY PREPARATIONS NOT INJECTED

210. DISSECTION OF FEMALE FOETUS. Dried and varnished.

211. VERTEBRAL COLUMN AND RIBS. Dried and varnished.

212. DISSECTION OF LARYNX. Dried and varnished.

213. DISSECTION OF LARYNX. Dried.

214. PORTION OF DRIED SKIN taken from the knee of Mrs. Hibner who was executed at Newgate, 13 April 1829, for starving and otherwise ill-treating a female parish apprentice. Tanned and curried by Job and Ebenezer Heath of Blackman Street. Executed by W. Fally.

215. MAIN VESSELS OF HEART WITH OPENING OF THORACIC DUCT.

216. HAIR AND CERECLOTH OF MUMMY.

217. CAST OF PELVIS OF KIDNEY in some black resinous substance.

218. CAST OF PELVIS OF KIDNEY in red wax.

219.
220. } SPECIMEN JARS bearing the seal GUYS.

III. PREPARATIONS IN SPIRIT

221. HAND injected with mercury to show small vessels.

222. TESTIS AND EPIDIDYMIS injected with mercury.

223. SEMINAL VESICLES injected with mercury.

224. CAPILLARY VESSELS OF PREPUCE injected with vermilion.

225. SKIN OF CHEST TATTOOED IN RED AND BLUE showing ship in full sail. Figures of sailor and girl. Initials G.P. and name H. A. WILSON. Spirit preparation.

226. SKIN TATTOOED WITH FIGURES OF ANIMALS IN BUSHMAN STYLE.

227. SKIN TATTOOED WITH COAT OF ARMS surrounded by flags.

228. WAX PREPARATION representing the distribution of the nerves of the face, consisting of the *pes anserinus*, the frontal nerve, and the infra-orbitary nerve; their ramifications and their unions with each other. By James Paxton, Member of the Royal College of Surgeons, London. Presented to the Ashmolean Museum in 1824.

SURGICAL INSTRUMENTS

I. ANCIENT

240. FACSIMILES OF ROMAN SURGICAL INSTRUMENTS from Pompeii, including dilator, catheter, &c. Presented by Sir John Findlay.

241. FACSIMILES OF CONTREPAN AND SCALPELS from Nineveh.

242. FACSIMILES OF KNIVES used in MUMMIFICATION. Egypt.

II. INSTRUMENTS FOR BLEEDING

250. CAST OF ANCIENT GREEK SCALPELS AND CUPPING VESSELS. From Temple of Asklepios in Athens. *c.* 350 B.C., with models of cupping vessels.

251. FIVE SETS OF LANCETS, one used by Dr. Daubeny as a student (*c* 1815).

252. SETS OF FLEAMS and other instruments probably used for veterinary bleeding, in ornate chased-steel holder (eighteenth-century), presented by E. Heron Allen.

253. SET OF 2 FLEAMS by ROBINSON OXFORD in brass holder.

254. SET OF 3 FLEAMS in brass holder marked with crown and letter W.

255. ARTIFICIAL LEECHES IN CASE signed W. M. KIDSTON & CO/MANUFACTURERS/18, BISHOPSGATE STREET (LONDON) REG. FEB. 11th 1858, formerly the property of Penrose Williams.

256. LEECH GLASS, presented by Dr. H. Gunther.

257. CUPPING SET comprising scarificator in leather case and 2 cups by W. PEPYS, POULTRY, LONDON.

258. CUPPING SET by EVANS, LONDON. Two scarificators, brass ball, and tube, bottle with glass stopper, tow. Formerly the property of J. O. Sankey, M.R.C.S., L.R.C.P., d. *c.* 1926. In mahogany case lined red velvet.

259. TWO SCARIFICATORS arranged to show trigger and protruding blades.

260. SCARIFICATOR AND BRASS SPIRIT-LAMP from cupping set inscribed J. LAMPHREY.

261. CUPPING INSTRUMENT used by Sir Alfred Garrod (*c.* 1870). Presented by Sir Archibald Garrod. In mahogany case, lined purple velvet.

III. LITHOTOMY INSTRUMENTS

279. TROCAR AND CANNULA, silver and ivory, in leather case (eighteenth century).

280. CASE OF TROCARS by COXETER AND SON, 23 Grafton Street East, W.C. Mid-nineteenth century.

281. TROCAR. Nineteenth century.

282. BOUGIES steel, labelled DONATION MR LONG JULY 7, 1818.

283. LARGE PEWTER BOUGIES by COXETER.

284. FLEXIBLE CAST PEWTER BOUGIES by W. SMYTH.

285. URETHRAL DILATORS, bulbous type.

286. THREE CATHETERS, two of silver, one marked SMYTH.

287. SET OF CURVED GROOVED STAFFS marked CARGILL. TWO STRAIGHT STAFFS marked PEPYS.

288. GROOVED STAFF OR DIRECTOR by PEPYS.

289. GORGETS (eighteenth and nineteenth century).

290. DOUBLE-ENDED LITHOTOMY SCOOP.

291. LITHOTOMY FORCEPS (eighteenth century).

292. URETHRA FORCEPS.

293. LITHOTRITE, signed MATHIEU à PARIS.

294. STONE CRUSHER (eighteenth century).

295. THREE URETHRAL BISTOURIES OR LITHOTOMES (*c.* 1830).

296. LITHOTOMY SET signed WEISS'S IMPROVED AIR-TIGHT CASE 62 STRAND LONDON containing lithotrite, 8 forceps, webbing straps, sounds, cannula, drainage tubes, gorgets, but only one knife out of the nine for which places are provided. (*c.* 1860). Presented by Major A. Pam.

297. LONG DRILLS, perhaps for operations on hip.

298. PERFORATOR by EVANS.

299. LION FORCEPS formerly the property of Sir W. Fergusson, Bart. (*c.* 1860).

300. OSTEOTOME also formerly the property of Sir W. Fergusson.

301. MURPHY'S BUTTON.

302. LISTON'S ARTERY FORCEPS used by Lord Lister.

303. HAEMORRHOID CLAMP by W. MATTHEWS.

304. FOREIGN BODY EXTRACTOR.

305. TRACHEOTOMY TUBES, Sir William Fergusson's pattern.

306. PHYSICIAN'S INSTRUMENT CASE (eighteenth century). Probe, grooved staff, spatula, and artery forceps. All silver or silver mounted. With white shagreen case.

307. SETON NEEDLES. Early nineteenth century.

308. INSTRUMENTS USED BY J. SOPER STREETER (*c.* 1830). Scissors, scarificators for vaccination, 2 bistouries blunt and sharp-pointed, lancet, gum-lancet, 2 tenacula.

309. TWO POCKET-CASES USED by J. SOPER STREETER (*c.* 1830). One with instruments *in situ*.

310. VALENTINE'S MICROSCOPIC SECTION KNIFE. Two examples: one from Gunther Loan Collection.

311. IRON ARM-SPLINT, probably of early seventeenth century. Presented by Major A. Pam.

312. AMPUTATION SAW, seventeenth or eighteenth century. (A modern blade has been inserted.)

313. FORCEPS for extraction of foreign bodies, one limb forged into a scalpel (seventeenth century or earlier).

V. TREPANNING INSTRUMENTS

314. TREPANNING INSTRUMENTS in brass-bound fish-skin case marked HOPITAUX AMBULANTS. Brace signed BOGNER

STRASBOURG, with various trephines, elevators, and brush (eighteenth century). Presented by Sir John Findlay.

315. THREE SURGEONS' BRACES AND BITS, eighteenth century.

316. TREPANNING SET in fish-skin case (late eighteenth century).

317. TREPANNING SET. Lent by the Royal College of Surgeons. (Early nineteenth century.)

318. TREPANNING SET used by S. S. Forte of Barbados (*c.* 1830). Presented by C. S. Forte.

319. STAND WITH PRIMITIVE SURGICAL INSTRUMENTS used for trepanning, with specimens of skulls. Prepared and presented by Dr. T. Wilson Parry.

VI. CASES OF SURGICAL INSTRUMENTS

320. NAVAL SURGEON'S CASE OF INSTRUMENTS by STODART, used by Joseph Bellot, R.N., of H.M.S. PEGASUS (*c.* 1795). Lent by the Royal College of Surgeons.

321. CASE OF SURGICAL INSTRUMENTS by SAVIGNY. Early nineteenth century. From the Anatomy School, Christ Church.

322. POST-MORTEM INSTRUMENTS by WEISS. From the Anatomy School, Christ Church.

323. CASE OF SURGICAL INSTRUMENTS in complete and new condition (*c.* 1850). Signed WEISS'S IMPROVED AIR-TIGHT 62 STRAND LONDON. Presented by Major A. Pam.

324. CASE OF INSTRUMENTS by EVANS for the resuscitation of the apparently drowned, as recommended by the Royal Humane Society (*c.* 1800). Contains bellows and leather pipes for rectal insufflations with tobacco smoke.

MEDICAL INSTRUMENTS

400. PULSE-GLASS, 25 seconds, used by John Coakeley Lettsom, about 1790.

401. MAREY'S SPHYGMOGRAPH, by BREGUET (*c.* 1885).

402. SPHYGMOMANOMETER signed CH^{LES} VERRIN PARIS, used by Sir William Osler (1849–1919).

403. SPHYGMOGRAPH, using tambours, probably *c.* 1885. No maker's name.

404. HAEMOGLOBINOMETER of early type used by Dr. A. E. Boycott (*c.* 1900). Presented by J. A. Boycott, Esq.

405. CLINICAL THERMOMETER with bent shank and large bulb, used by Sir Archibald Garrod and presented by him.

406. CLINICAL THERMOMETER 0–110° F., by NEGRETTI & ZAMBRA, presented by Sir D'Arcy Power.

407. SOLID WOODEN STETHOSCOPE.

408. WOODEN STETHOSCOPE with folding earpiece.

409. STETHOSCOPE OF IVORY, EBONITE, AND WOOD used by Dr. A. E. GUNTHER, presented by R. T. Gunther.

410. STETHOSCOPE OF WOOD AND IVORY, early nineteenth century, from Christ Church.

411. TWO PERFORATED WOODEN STETHOSCOPES, used by Sir Archibald Garrod.

412. RUSSELL AND WEST'S APPARATUS for estimating urea in urine. By E. CETTI. In wooden case.

413. EARLY OPHTHALMOSCOPE used by Sir Henry Acland. In black leather case with several lenses (*c.* 1860?).

414. GALEZOWSKI'S OPHTHALMOSCOPE in leather case, by ROBERT & COLLIN à PARIS. With descriptive leaflet. Used by Sir Henry Acland.

415. LIEBREICH'S OPHTHALMOSCOPE CASE. Mid-nineteenth century.

416. AURAL SPECULUM with lens and mirror. From Conrad Cooke Collection.

417. AURAL SPECULUM used by J. S. Streeter (*c.* 1830).

418. AURAL SYRINGE. Early nineteenth century.

419. LARGE PEWTER SYRINGE for administering clysters. Similar to those figured by sixteenth- and seventeenth-century authors.

420. WEISS'S PATENT SYRINGE, with leaflet and illustration, probably *c.* 1820.

421. SILVER ANATOMICAL SYRINGE in red leather case from Anatomy School, Christ Church.

422. PATENT HYDRAULIC MACHINE by I. READ, presented by Lt.-Commander J. D. R. Davies, R.N. Early nineteenth century.

423. SYRINGE AND ACCESSORIES, READ'S PATENT.

424. POTAIN'S ASPIRATOR by WEISS, 62 STRAND, LONDON, presented by Dr. R. H. Sankey.

425. HYPODERMIC SYRINGE used by Sir Henry Acland (*c.* 1900).

426. FIRST MODEL OF THE OXFORD VAPORISER, designed and made in Oxford laboratories (1941). Presented by Nuffield Department of Anaesthetics.

DENTAL INSTRUMENTS

450. FIVE TOOTH-KEYS, probably late eighteenth or early nineteenth century, one by MAW & SON, LONDON.

451. DENTAL FORCEPS, probably seventeenth century.

452. DENTAL FORCEPS by WEISS. Nineteenth century.

453. SET OF DENTAL TOOLS by LONG of OXFORD.

454. LOWER DENTURE, the whole carved out of solid ivory. Early nineteenth century.

455. ARTIFICIAL TEETH (nineteenth century).

456. DENTAL FILE AND SCRAPER in card case (late eighteenth century).

457. SET OF DENTAL TOOLS in leather case with mirror, used by J. Soper Streeter (*c.* 1830–50).

458. SET OF DENTAL TOOLS WITH AGATE HOLDER in fish-skin case (nineteenth century).

459. TWO KNIVES probably used for dental purposes (eighteenth to nineteenth century).

460. SMALL FLEAM, probably used as a gum-lancet.

461. TWO SMALL MIRRORS used for dental cosmetic purposes. One *c.* 1830.

500. PRESCRIPTION BOOK. 1840. Lent by Messrs. Allen & Hanbury.

501. PRESCRIPTION BOOK. 1869. Lent by Messrs. Allen & Hanbury.

502. ORDER FOR CHEMICALS from Dr. KIDD (see p. 22) at the Anatomy School, Christ Church. Dated 1 Oct. 1802. Presented by Messrs. Allen & Hanbury.

503. PRESCRIPTION BOOK, showing prescription, dated 12 Sept. 1835, by Dr. J. A. Paris, friend of Davy and Faraday, and another by Dr. Southwood Smith, the famous sanitarian, dated 24 July 1834. Lent by Messrs. Allen & Hanbury.

504. PILL-ROLLING SLAB decorated with the arms of the Society of Apothecaries. These slabs were used as signs. (seventeenth century.)

505. PILL-ROLLING BOARD with brass flutings to ensure uniformity of the product (eighteenth century.)

506. PILL-ROLLING BOARD with brass flutings by STUART, 101 DRURY LANE (*c.* 1800).

507. APOTHECARY'S SCALE by I. & W. HOLT/SCALE MAKERS N. 51 HAY MARKET/ST. JAMES'S. Ivory Pans.

508. MINIATURE SCALES AND WEIGHTS. Silver. RICH^{D} ROBERTS IN BARTHOLOMEW LANE NEAR THE ROYAL EXCHANGE, LONDON.

509. SCALES AND SET OF CUP WEIGHTS by MARY DE GRAVE (*c.* 1800). In oak case with trade label.

510. HORN FEEDING-BOTTLE, probably *c.* 1800. Lent by Messrs. Allen & Hanbury.

511. GLASS FEEDING-BOTTLE marked JAUGE DE TÉTÉES and graduated in cubic centimetres (late nineteenth century). Lent by Messrs. Allen & Hanbury.

512. HOMOEOPATHIC MEDICINE CHEST. Box made of cardboard, in the form of a book covered with leather and gilt with inside and outside dentelles; contains 112 bottles (2 missing) in two trays with list of contents (*c.* 1820).

513. ACCOUNT OF C. TIFFIN, BUG DESTROYER TO HIS MAJESTY (dated July, 1827). With his trade-card. Presented by Dr. A. Moore Hogarth, founder of the college of Pestology.

514. TWO CUT GLASS BOTTLES containing *Oleum Cedrati* and *Oil of Spikenard*, and another also containing *Oil of Spikenard*. To show style of labelling, about 1850.

515. THREE PAINTED GLASS BOTTLES inscribed AQ. COCHLEARIÆ: MAG^{O} SATURN: PULV. CORALL RTR (eighteenth century).

516. TWO OINTMENT JARS dug up on the Bodleian Site, probably the medical quarter of Oxford (seventeenth century).

517. SMALL DRUG-POT of LAMBETH WARE (*c.* 1690).

518. BOX IN THE FORM OF A BOOK, bound in white silk embroidered with silver, and containing eight small phials of Quintessences (Italian, early seventeenth century).

519. PACKET labelled 'DR. JAMES'S FEVER POWDER, prepared by *R. James* and sold by F. Newbery.' Price 2*s.* 6*d.* a packet. With F. Newbery's account book recording sales of such powders (1773) and a reproduction of a trade-card advertising it. It will be remembered that Oliver Goldsmith was in the habit of 'quacking himself with Dr. James's powders'.

520. BRONZE MORTAR, probably eighteenth century.

521. BELL-METAL MORTAR, inscribed SOLI DEO GLORIA 1627. Probably Dutch.

522. BRONZE MORTAR. Inscribed SOI DE BENITA-GARZIA PICAZO ANO 1696.

523. WOODEN DRUG-MILL. Lent by Messrs. Allen & Hanbury.

524. LARGE DRUG-MILL on WOODEN STAND. Lent by Messrs. Allen & Hanbury.

525. COLLECTION OF DRUG-JARS. Mostly from Gunther Loan Collection.

526. APPARATUS employed (*c.* 1940) in the investigations upon PENICILLIN. Presented by the Sir William Dunn School of Pathology.

SPECTACLES

600. SPECTACLES with HORN MOUNTS, extending ear-pieces: in horn case (eighteenth century).

601. SPECTACLES, IRON FRAMES, AND CASE (eighteenth to nineteenth century).

602. FOLDING SPECTACLES IN BRASS CASE inscribed 'THE GIFT OF M$^{r.}$ CHR^{r} SWIFT to M$^{r.}$ DEN$^{s.}$ LEARY' (eighteenth to nineteenth century). Presented by Sir Robert McCarrison, 1936.

603. VARIOUS SPECTACLES of late eighteenth to mid-nineteenth century.

604. MANDARIN'S SPECTACLES. Plain glass in shagreen case.

605. SPECTACLES formerly used by Sir Richard Owen (d. 1892.)

606. TWO SETS OF SPECTACLES IN TORTOISESHELL used by opticians for sight-testing (mid-nineteenth century).

607. APPARATUS FOR READING TEST.

608. READING-GLASS. German (eighteenth century).

MEDICAL SUPERSTITIONS

650. IVORY INSTRUMENT for taking altitudes for astrological purposes; in painted wooden box with table of zodiacal signs and aspects (*c.*1690).

651. THREE RHINOCEROS-HORN LIBATION CUPS. From remote antiquity the Chinese believed that these will sweat or change colour if poison be placed in them. A similar belief prompted the adoption of the rhinoceros as a part of the arms of the Society of Apothecaries.

652. A SAPPHIRE FOR THE EYES. A piece of iolite, considered in the middle ages to be a sapphire, and shaped to fit the eye socket. Lent by Miss Joan Evans.

653. THE RIGHT ELATROP. A jadeite neolithic celt mounted in the sixteenth century in silver. This was the 'speciall stone' to 'stanche bleeding and good against poison'. Lent by Miss Joan Evans.

654. MAGICAL BRACELET reputed to have been the property of Dr. John Dee and to have been worn by Queen Elizabeth to cure her rheumatism. It is of silver and bears a magical inscription. Attached

to it are (1) an aëtites (a hollow flint pebble enclosing another, which rattles); (2) a nutmeg (?) in a silver wire cage; (3) a silver setting which may have held an 'elatrop' (see No. 653); (4) a small silver disk, set with three polished convex flints. Lent by Sir Arthur Russell.

655. RING SET WITH A LOAD-STONE. Enamel and gold. Seventeenth century.

656. CRYSTAL BALL as used for skrying. Considered to be a valuable aid to diagnosis.

657. SOUTH ITALIAN SILVER AMULETS showing winged sea-horse, crescent-moon, hand making the fig-sign, two-tailed mermaid, and 'cimaruta' or bunch of rue (Gunther Loan Collection).

658. TURKISH OR EGYPTIAN VERSION of the South Italian amulets (Gunther Loan Collection).

ORIENTAL MEDICINE

670. HERMANN GUNTHER COLLECTION OF JAPANESE NETSUKE of medical interest.

COLLECTIONS OF MATERIA MEDICA

701. MAHOGANY CABINET WITH SIX OAK DRAWERS containing 1,032 specimens of Materia Medica. Plants, animals and their parts, metals, ores, precious stones, minerals, roots, woods, barks, gums, resins, juices, flowers, fruits, and seeds. All labelled. Manuscript catalogue in two volumes. Bill, dated 1729, for £21. 6*s*. 8*d*. The Cabinet and contents were bought by Tho. Jobber from Jos. Clutton, Holborn, London, and came into the possession of Dr. John Oglander, Warden of New College (1768–94), who bequeathed it to the College, which has lent it to this Museum.

702. THE MUSEUM POINTERIANUM. A collection of 'several sorts of Rarities, both Natural and Artificial: bequeathed to St. John's College *c.* 1720'. It is contained in an oak chest. The specimens are set out in trays. It contains the earliest collection of bird's eggs and also some 'Physical Drugs'. Lent by St. John's College.

703. THE DYER COLLECTION. An oak cupboard on legs containing specimens of seeds, &c. probably collected by Richard Dyer *c.* 1700, and also the type-specimens of fossils described by Edward Lhwyd in 1699. Lent by Oriel College.

TRAVELLING MEDICAL CASES

710. PORTABLE MEDICINE CHEST. Walnut. The drugs are contained in pewter screw-topped metal cylinders and bottles, and in small square wooden boxes. The labels include ☿ DULC; OPIUM; ♀ EMET; PULV. R. JALAP; CAMPHYR; PULV:MA; PULV:ANTISPAS. Tyrolese, seventeenth century.

711. PORTABLE MEDICINE CHEST, formerly the property of J. Soper Streeter, *c.* 1830–50. Contains various drugs, scales and weights, measuring glass, mortar, and various dressings. The dressings and drugs are of later date.

712. TRAVELLING CASE, formerly the property of Sir Henry Acland.

MEDICAL ELECTRICITY

713. INDUCTION COIL with SMEE elements, brass handles, also disk electrodes. No date, but probably *c.* 1860, from Christ Church.

714. GRIGG'S CONICAL ELECTROMAGNETIC MACHINE. Patented 8 January 1873. With two Smee Elements in glass jar. Presented by Dr. Turrell.

715. APPAREIL D'INDUCTION. VOLTA FARADIQUE. Breveté S.G.D.G. À GRIFFE À PARIS. With various accessories, including tube of mercuric sulphate.

CHEMICAL APPARATUS

Almost all of the apparatus shown came from the Daubeny Laboratory, formerly in the building facing Magdalen College. The greater part dates from the period 1815–30.

I. MEANS OF HEATING

800. FIRECLAY FURNACE FOR HEATING TUBES, fired by charcoal, *c.* 1818.

801. TWO IRON CHARCOAL FURNACES FOR HEATING TUBES.

802. COOPER'S TUBE FURNACE for combustion analysis, *c.* 1828, with combustion tube of Berlin porcelain.

803. NEWMAN'S BLOWPIPE. Could be used with air or with oxygen and hydrogen, *c.* 1816.

804. GURNEY'S OXY-HYDROGEN BLOWPIPE, *c.* 1823.

805. EARLY TYPES OF BUNSEN BURNER (*c.* 1870).

806. LARGE BURNING-GLASS which formed part of the equipment of the chemical laboratory in the basement of the Old Ashmolean Building (*c.* 1750).

II. RETORTS

810. RETORT, BERLIN PORCELAIN with detachable head.

811. RETORTS, YELLOW-GLAZED STONE-WARE used for chemical and pharmaceutical distillations, *c.* 1830.

812. RETORTS OF GREEN GLASS. Used where special fire resistance was not required, *c.* 1830.

813. RETORTS OF FRENCH FIRECLAY. Plain, and with long and short tubulures.

814. PEAR-SHAPED BODIES OF CLEAR GLASS with tubular receivers.

815. GLOBULAR RECEIVERS for volatile liquids.

816. GLASS ADAPTER, to be interposed between retort and receiver.

III. ALEMBICS

820. ALEMBIC complete with head, body, and receiver. Probably *c.* 1800.

821. ALEMBIC HEADS, glass, various types.

822. COPPER STILL, early nineteenth century.

823. COPPER STILL-HEAD, eighteenth to nineteenth century.

824. PEWTER STILL-HEAD, eighteenth to nineteenth century.

825. APPARATUS for FRACTIONAL DISTILLATION. Alembic and three condensing bulbs in horizontal series. As described by Peter Woulfe (*Phil. Trans.* LVII. p. 517. 1767), but probably of later date.

826. APPARATUS for FRACTIONAL DISTILLATION similar to the above, but with bulbs arranged vertically.

827. COMPOUND DISTILLATORY APPARATUS of HASSENFRATZ, designed to separate volatile liquids to absorb soluble gases and to collect any residual gases evolved (*c.* 1780).

830. PRIESTLEY'S APPARATUS FOR COLLECTING GASES evolved when metals dissolve in acids with effervescence.

831. LAVOISIER'S APPARATUS FOR CHEMICAL DISSOLUTIONS. The rod ground into the funnel permits addition of reagents without escape or admission of gases.

832. VARIOUS PIECES OF APPARATUS FOR MANIPULATING GASES.

833. DETONATING BOTTLES.

834. DETONATING CYLINDERS.

835. GRADUATED GAS-MEASURING TUBES.

836. EUDIOMETERS. The electrodes are of copper, cemented into the glass.

V. APPARATUS FOR ANALYSIS

837. VARIOUS PIECES USED FOR ANALYSIS.

838. DROPPING BOTTLE for acidimetry and alkalimetry.

839. MARSH'S ARSENIC TEST APPARATUS.

840. SIR HUMPHRY DAVY'S APPARATUS FOR ESTIMATING CALCIUM CARBONATE IN SOIL. Acid is allowed to flow into the soil; the gas evolved distends the bladder and displaces its own volume of water from the spouted vessel into a measure.

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